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EXAMINER	
PRICE, CARL D	

ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/700,339	CHODACKI ET AL.	
	Examiner	Art Unit	
	Carl D. Price	3749	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09/29/2008 (RCE Filed)*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6,16,17,21,22 and 32-39* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,16,17,21,22 and 32-39* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date ____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on **09/29/2008** has been entered.

Response to Amendment

Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn.

Claims

Claims 16,17,21,22 and 32-37 appear in the form previously presented.

Claims 38 and 39 are newly presented.

Claims 7-15, 18-20 and 23-31 are cancelled.

Response to Arguments

Applicant's arguments with regard to claims 16,17,21,22 and 32-37, filed on 09/29/2008, have been fully considered but they are not persuasive.

Applicant's arguments with respect to claims **1-6, 16, 17, 21, 22** and **32-37** have been considered but are moot in view of the new ground(s) of rejection.

Applicant has presented new claims 37 and 38 which are of a scope not previously considered. Consistent with applicant's argument that the prior art relied on in the previous office action fail to show, disclose and/or teach certain aspects of applicant's invention now recited in the claims filed on **10/19/2007,** applicant has amended the claims include at least the following:

Applicant's remarks are made in response to the rejection is of claims **1-6, 16, 17, 21, 22** and **32-35** which were rejected under 35 U.S.C. 103 over U.S. Patent **3589846 (Place)** in view of

EP00385910 and U.S. Patent **5660043 (Pfefferle et al.)**, U.S. Patent **5899684 (McCoy et al.), US 5206484 (Issartel)** and **US 4106889 (Katchka).**

Applicant again traverses the rejection of the claims appears based on impermissible hindsight reconstruction of Applicants' claimed invention arguing that:

> "Pfefferle reports an aircraft gas turbine combustor. Pfefferle does not disclose or otherwise suggest a ceramic igniter or use of such an igniter with an appliance as Applicants claim."; and,
>
> "Indeed, contrary to the premise of the instant rejection, the cited element of Pfefferle employed in an aircraft gas turbine combustor is quite distinct from and would not have been used in the clothing-dryer system reported in the Place document. Clearly, the skilled worker would not have looked to an aircraft turbine for design of a clothes dryer system."

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). In this regard, applicant's attention is directed to **US005899684 (McCoy et al)** and **US005660043 (Pfefferle et al),** which establishe the knowledge and the level of ordinary skill at the time the claimed invention was made. **US005899684 (McCoy et al)** discloses and teaches the use of hot surface (i.e.- electric resistance) ignition systems for gas ignition in a wide range of units (e.g.- "gas clothes dryers, gas ovens, gas fired furnaces, and boilers thus replacing and eliminating standing gas pilot lights"), **for more than twenty years. US005899684 (McCoy et al)** also discloses these strong oxidation resistant ceramic hot surface ignition elements reaches ignition temperature in less than 10 to 15 seconds and utilizes about 40 watts of power. **US005660043 (Pfefferle et al)** teaches that it is known to maintain the electric resistance igniter at an operational temperature that is less than the gas ignition temperature but above room temperature and so the ceramic electric resistance igniters can be re-heated so as to re-ignite the gas within a near instantaneous re-ignition time period.

Clearly, in view of the teachings of **US005899684 (McCoy et al)** and **US005660043 (Pfefferle et al),** the examiner does not rely on knowledge gleaned only from the applicant's disclosure. That is, since both **US005899684 (McCoy et al)** and **US005660043 (Pfefferle et al)** acknowledge the use of electric resistance ignition systems to solve the problem of very low re-ignition times, and where **US005899684 (McCoy et al),** in particular, acknowledges the use of ceramic electric resistance ignition elements as particularly useful to produce quick re-ignition response, since operation of the electric resistance igniter can be controlled so the electric resistance igniter is at a temperature less than the gas ignition temperature so the electric resistance igniter can be re-heated so as to re-ignite the gas within a desired re-ignition time period.

Furthermore, concerning the examiner's alleged use of hindsight and whether a person having ordinary skill in the art would readily use electric resistance ceramic ignition elements generally and more specifically the claimed "sintered ceramic ignition" (new claims 36 and 37) taught in prior art fields other than that intended for applicant's invention ("in the clothing-dryer system"), applicants' attention are directed to the newly cited prior art references of **US004418661 (Esper), US005233166 (Maeda et al)** and/or **US004762982 (Ohno et al)** which separately and collectively teach sintered ceramic electric resistance ignition elements are known to be used widely as an ignition source for various combustion and heating apparatuses, can quickly raise temperature, can be used for an extended period of time regardless of environmental conditions and is superior in ignition reliability and safety (e.g.- US005233166 (Maeda et al); sintered ceramic electric resistance ignition heaters (glow plugs) are known to quickly achieve preheat temperature necessary to ignite fuel vapor-air mixture "in less than 1 second" (see US004418661 (Esper)) and "for example to about 900.degree. C. in about three seconds" (see US004762982 (Ohno et al)).

In view of the teachings of **US004418661 (Esper), US005233166 (Maeda et al)** and/or **US004762982 (Ohno et al),** as well as that which is taught by **US003589846 (Place), US005899684 (McCoy et al)** and **US005660043 (Pfefferle et al),** the examiner can not agree with applicants' assertion that the recitation "near instantaneous relight" in the Pfefferle document is not a disclosure of six seconds or less as Applicants claim. When viewing evidence found in the prior art as a whole, only represented in part by the prior art discussed immediately

herein above, it is clear that a person having ordinary skill in the art would understand the recitation "near instantaneous relight" (Pfefferle) as a period of time not inconsistent with igniting a fuel-air mixture "in less than **1** second" (US004418661 (Esper); and "about **three** seconds" US004762982 (Ohno et al**).** Further in this regard, the examiner maintains the position that "since the actual warm-up time for a given appliance control application would necessarily depend on numerous design parameters such as the type and amount of fuel burned, the size and type of resistance igniter, the overall size and shape of the burner, etc., to operate **US003589846 (Place)** such that the desired re-ignition time period is about six seconds or less can be viewed as nothing more than merely a matter of choice in design absent the showing of any new or unexpected results produced therefrom over the prior art of record. Similarly, selective use of a given fuel ignition system with any given appliance would have been obvious to a person having ordinary skill in the art and would be dictated by given installation or design concerns. Indeed, the "less than **1** second" (US004418661 (Esper)) and "about **three** seconds" (US004762982 (Ohno et al**))** igniting of a fuel-air mixture present evidence that ignition time period may vary according a given installation of combustor arrangement. However, in further support the examiner's position applicant's attention is directed to, for example, **US005206484 (Issartel)** which acknowledges that operational conditions such as outside temperature, heating currents and thermal inertia affect and indeed are used to determine the time required to preheat glow-plugs.

US005206484 (Issartel) discloses:

> (3) To start high-compression engines under cold conditions, one uses electrical ignition glow-plugs which must reach the operational temperature (1000.degree. C. or more) before the starter motor is switched on. Now, the **time required to preheat glow-plugs** may last, depending on the outside temperature, from **a few seconds to several tens of seconds** because the heating element of the plug has a substantial degree of thermal inertia; hence one has sought to reduce the delay as much as possible by using **very large heating currents** as well as automated **systems for controlling this current** when the desired temperature is attained, thereby avoiding premature deterioration of the plug. When a glow-plug normally operates under the foregoing conditions, it is subject to high stress and thermal shocks which threaten to prematurely end its operating life.

In view of the teachings of **US004418661 (Esper), US005233166 (Maeda et al)** and/or **US004762982 (Ohno et al),** as well as that which is taught by **US003589846 (Place)**,

US005899684 (McCoy et al) and **US005660043 (Pfefferle et al),** one can not deny that electric resistance ignitors in general, ceramic electric resistance ignitors, and more specifically sintered ceramic electric resistance ignitors, are used widely as an ignition source for various combustion and heating apparatuses. In this regard the examiner simply can not agree with applicants' suggestion that "Clearly, the skilled worker would not have looked to an aircraft turbine for design of a clothes dryer system.", since the prior art defines the field of endeavor for sintered ceramic electric resistance ignitors to be used widely as an ignition source for various combustion and heating apparatuses. Certainly, the gas turbine electric resistance ignitor of **US005660043 (Pfefferle et al)** represents and falls within the understanding of the prior art acknowledged "various combustion … apparatuses", And, **US003589846 (Place)** being applied to burners of the type used in clothes dryers, furnaces and the like" certainly represents and falls within the understanding of prior art acknowledged "various … heating apparatuses".

Furthermore, the teachings presented in the prior art references of **US004418661 (Esper), US005233166 (Maeda et al)** and/or **US004762982 (Ohno et al)** not only address the specific limitations of the claimed invention set forth in claims **36** and **37,** but also illustrate the level of ordinary skill in the art at the time of the invention with respect to at least the known advantages, properties and characteristics of electric resistance ignitors in general, ceramic electric resistance ignitors, and more specifically sintered ceramic electric resistance ignitors, with regard to the limitations of the claimed invention set forth in claims **1-6, 16, 17, 21, 22, 32-35, 38** and **39.** That is, sintered ceramic electric resistance ignition elements are known to be used widely as an ignition source for various combustion and heating apparatuses, can quickly raise temperature, can be used for an extended period of time regardless of environmental conditions and is superior in ignition reliability and safety. (12).

In support of the examiner's statement that "… selective use of a given fuel ignition system with any given appliance would have been obvious to a person having ordinary skill in the art and would be dictated by given installation or design concerns", applicants' attention is directed to **US004106889 (Katchka)** which acknowledges the use of "combustible fuel such as propane, natural gas and the like" for operating fuel fired appliances of the type using electric resistance igniters**.**

US004106889 (Katchka) discloses:

> The control circuit of this invention is of particular advantage with a **glow plug ignition circuit** since it provides for discontinuous energizing of the glow plug whereby the **glow plug** is **energized only when needed**, i.e, for ignition of the pilot burner flame. **This greatly reduces the bulk and cost of the voltage supply transformer for the ignition circuit and extends the life of the glow plug element**.
>
> The appliance burner for the circuit has a main supply conduit 160 for the supply of **combustible fuel such as propane, natural gas and the like.** The main supply line is connected through pilot valve 156 and main valve 158 to the pilot burner 18 and the main fuel burner 16, respectively. The pilot burner has ignition facilities including a sparking electrode 22 which is in circuit with an ignition circuit generally indicated as 24.

The claims remain rejected for the reasons set forth herein above and for the reasons set forth in the examiner's action appearing herein below

Claim Objections

Claim 39 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Since claim 38 positively recites a system having a gas-fired stove, oven, or water-heater, the recitation "gas-fired stove, oven, or water-heater" in claim 39 presents a claim which is not further limited.

Double Patenting

A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or discovers any new and useful process ... may obtain a patent therefor ..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957); and *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970).

A statutory type (35 U.S.C. 101) double patenting rejection can be overcome by canceling or amending the conflicting claims so they are no longer coextensive in scope. The

filing of a terminal disclaimer cannot overcome a double patenting rejection based upon 35 U.S.C. 101.

Claims 38 and 39 are objected to under 37 CFR 1.75 as being a substantial duplicate of claims 32-34, respectively. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Applicant is advised that should any one of claims 32-34 be found allowable, claims 38- and 39 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims: Rejected under 35 U.S.C. 103(a)

Claims 1-6, 16, 17, 21, 22, 32-35, 38 and **39,** are rejected under 35 U.S.C. 103(a) as being unpatentable over **US003589846 (Place)** in view of **EP000385910B1** and **US005660043 (Pfefferle et al)** and **US005899684 (McCoy et al)** (of record), and in view of **US005206484 (Issartel)** and **US004106889 (Katchka)** which are now cited in response to applicants' request that the examiner provide support for positions previously stated.

US003589846 (Place) shows and discloses gas control system that:

- controls energizing an ceramic electric resistance igniter (23) from a power source;
- a switching mechanism (42,52) connected between the electric resistance igniter and the power (L1, l2);
- the electric resistance igniter responsive to an input signal from door and timer switches (42, 49);
- wherein the control device controls operation of the electric resistance igniter (23) so as to warm-up the electric resistance igniter to a temperature at or above an ignition temperature for a gas being combusted; and
- wherein following successful ignition of the gas, operation of the electric resistance igniter is controlled so the electric resistance igniter is at a temperature less than the gas ignition temperature so the electric resistance igniter can be re-heated so as to re-ignite the gas within a desired re-ignition time period. In this regard **US003589846 (Place)** discloses **(see column 5, lines 28-34)**.

> "… The igniter can cause ignition when its temperature is above **1,400^0 F.** to **1,600^0 F.**" **(column 4, lines 62-69)**
>
> "If ignition occurs properly, sufficient heat is radiated by the flame and the igniter 23 to hold the switch 58 open. In the illustrate embodiment, the **igniter drops to about 1000^0 F,** when equilibrium is reached after ignition occurs. **This temperature is maintained in the igniter** by the presence of the flame **and the low voltage applied to the igniter.**"

US003589846 (Place) discloses a controlling operation of the igniter so the igniter is at a temperature less than the ignition temperature but above room temperature and within 600^0 C of the gas ignition temperature. The ignition of the fuel in **US003589846 (Place)** occurring at "**above 1,400^0 F.** to **1,600^0 F.**" **(760^0 C** to **871^0 C)** and the temperature at which igniter is maintained after ignition occurs being a temperature of "**about 1000^0 F**" **(538^0 C).**

US003589846 (Place) shows and discloses the invention substantially as set forth in the claims with possible exception to the control device including:

- a micro-controller and an applications program for execution in the micro-controller including instructions and criteria for outputting control signals to the switching mechanism to selectively control voltage and current being applied to the electric resistance igniter; and
- the desired re-ignition time period is about six seconds or less.

EP000385910B1 teaches, from the same appliance control field of endeavor as **US003589846 (Place)**, using a micro-controller (M1) and an applications program for execution in the micro-controller including instructions and criteria for outputting control signals to a switching mechanism to selectively control voltage and current being applied to an electric resistance igniter.

US005660043 (Pfefferle et al) is shows and discloses gas control system that:

- controls energizing an ceramic electric resistance igniter (30) from a power source (not shown);
- a switching mechanism (not shown) connected between the electric resistance igniter and the power;
- wherein the control device controls operation of the electric resistance igniter **(column 4, lines 15-30)** so as to warm-up the electric resistance igniter to a temperature at or above an ignition temperature for a gas being combusted; and
- wherein following successful ignition of the gas, operation of the electric resistance igniter is controlled so the electric resistance igniter is at a temperature less than the gas ignition temperature so the electric resistance igniter can be re-heated so as to re-ignite the gas within a desired re-ignition time period. **(column 4, lines 15-30)**

US005899684 (McCoy et al) teaches, from the same appliance control field of endeavor, to provide fast re-ignition period of less than 6 seconds ("if the flame is not detected in less than one second after the ignitor is de-energized") by operating the ignitor from a half-wave voltage phase regulator during normal RUN thus being capable of operating on one half the amplitude of the applied voltage, which would necessarily produce an ignition temperature above ambient and below a fuel ignition temperature.

> (5) In the third embodiment of the present invention, a first circuit is provided that applies full-wave voltage to the ignitor only during the preheat and ignition trial periods for ignition purposes. A second circuit is provided that applies half-wave voltage to the ignitor continuously, beginning with the RUN period, **for fast re-ignition and to burn any fuel** coming in contact with the ignitor during the RUN period and **thus prevents carbon buildup on the ignitor,** especially if heavy fuels, such as diesel, are used. A third circuit is provided which automatically adjusts the preheat time and the ignition on-time, depending on the applied line voltage and the current draw of the ignitor.
>
> 35) Thus it is an object of the third embodiment of the present invention to operate the said ignitor from **full-wave AC voltage during STARTUP** and on half-wave voltage

> from a **half-wave voltage phase regulator during normal RUN** thus being capable of operating on one **half the amplitude** of the applied voltage.

In regard to **claims 1-6, 16, 17, 21, 22, 32-35, 38 and 39,** for the purpose of providing a suitable means for selectively controlling, operating and monitoring the electric resistance igniter of **US003589846 (Place),** it would have been obvious to a person having ordinary skill in the art to modify the controller of **US003589846 (Place)** to include a micro-controller and an applications program for execution in the micro-controller including instructions and criteria for outputting control signals to a switching mechanism to selectively control voltage and current being applied to an electric resistance igniter , in view of the teaching of **EP000385910B1**. Also, in view of the teaching of **US005660043 (Pfefferle et al),** that "continued controlled heating may be utilized to provide near instantaneous relight", and **US005899684 (McCoy et al)** where the flame is can be detected in less than one second after the ignitor is de-energized, it would have been obvious to a person having ordinary skill in the art to operate **US003589846 (Place)** in a manner which would permit near instantaneous relight, that is, less than six seconds. Notwithstanding the teaching of **US003589846 (Place)**, since the actual warm-up time for a given appliance control application would necessarily depend on numerous design parameters such as the type and amount of fuel burned, the size and type of resistance igniter, the overall size and shape of the burner, etc., to operate **US003589846 (Place)** such that the desired re-ignition time period is about six seconds or less can be viewed as nothing more than merely a matter of choice in design absent the showing of any new or unexpected results produced therefrom over the prior art of record **(**see **US005206484 (Issartel).** Regarding claims 32-34, 38 and 39, in particular, as taught by at least **US005899684 (McCoy et al)** ("*Hot surface ignition systems (HSI) have been used for more than twenty years for gas ignition in units such as gas clothes dryers, gas ovens, gas fired furnaces, and boilers thus replacing and eliminating standing gas pilot lights.*"), to operate the **US003589846 (Place)** ignition system in combination with any one of a stove, oven, clothes dryer, water, etc. (see **US005899684 (McCoy et al)** would have been obvious to a person having ordinary skill in the art. Regarding claim 35, Official Notice is taken that it is well known to use propane as suitable a fuel for gas fueled appliances. Therefore, in view of that which is well known and for the known purpose, it would have been

obvious to a person having ordinary skill in the art to operate the combustion system of **US003589846 (Place)** with a propane fuel source.

Claims: Rejected under 35 U.S.C. 103(a)

Claims **36** and **37** are rejected under 35 U.S.C. 103(a) as being unpatentable over **US003589846 (Place)** in view of **EP000385910B1** and **US005660043 (Pfefferle et al)** and **US005899684 (McCoy et al)**, as applied to claims 1 and 6 above, and further in view of **US004418661 (Esper), US005233166 (Maeda et al)** or **US004762982 (Ohno et al).**

US003589846 (Place) shows and discloses the invention substantially as set forth in the claims with possible exception to:

- the electric resistance ceramic igniter being a sintered ceramic igniter.

US004418661 (Esper), US005233166 (Maeda et al) and **US004762982 (Ohno et al)** separately and collectively teach sintered ceramic electric resistance ignition elements are known to be used widely as an ignition source for various combustion and heating apparatuses, can quickly raise temperature, can be used for an extended period of time regardless of environmental conditions and is superior in ignition reliability and safety (e.g.- US005233166 (Maeda et al); sintered ceramic electric resistance ignition heaters (glow plugs) are known to quickly achieve preheat temperature necessary to ignite fuel vapor-air mixture "in less than 1 second" (see US004418661 (Esper)) and "for example to about 900.degree. C. in about three seconds" (see US004762982 (Ohno et al)).

US005233166 (Maeda et al) discloses:

> (5) A sheath heater or the like with a heating resistor comprising **heat-resistant insulating powder** and a metal wire with a high melting point embedded in a heat-resistant metal sheath **has been used as an ignition heater for various combustion apparatuses which burn gas** and kerosene and has also been used as a **heater for various heating apparatuses**.
>
> (6) The **above-mentioned sheath heater**, however, has some defects. It **cannot exhibit quick temperature rising** characteristics since heat is transmitted via the heat-resistant insulation powder. It is inferior in oxidation resistance and durability. In addition, it lacks reliability for positive ignition and raises problems in safety.

(7) **To solve such problems**, a **ceramic heater** comprising a heating resistor of an inorganic conductor embedded in **a** ceramic **sintered** body, which **can quickly raise temperature**, can be **used for an extended period of time regardless of environmental conditions** and is **superior in ignition reliability and safety**, has been **used widely** as an **ignition** source for **various combustion** and **heating apparatuses**.

US004418661 (Esper) discloses:

(11) Embodiment of **FIGS. 3 and 4**: **The glow plug heater 24'--FIG. 4--is a particularly desirable construction when fast preheating is important.** The **glow plug body 17'** has a **ceramic tube 20'** with a flange 18' and a bottom 21', for incorporation into a socket, for example as illustrated in FIG. 1; this portion of the structure is basically similar to that shown in FIGS. 1 and 2. The outer surface of the bottom 21' of **ceramic tube 20'** has a heat conductive layer 42 applied thereto in accordance with any known method, and made, for example, of a platinum/aluminum oxide layer. The purpose of the heat conductive layer is to prevent excessive temperature gradients in the densely **sintered ceramic** tube **20'**. This is accomplished by distributing heat which, in accordance with the particular heater construction, is concentrated essentially at only a single point. The heater element 24' is so constructed that heat is generated over only a very small area thereof. The heat conductive layer distributes the heat from this point-source over a wider area of the bottom 21'. The heat conductive layer 42 may be made of various metal/**ceramic compounds**, but preferably contains a metal which is platinum, a platinum metal, or alloys of platinum metal.

17) **Glow plugs** constructed with a **glow body 17'** in accordance with FIGS. 3 and 4 can reach the temperature necessary to ignite fuel vapor-air mixture **in less than 1 second**. The requisite temperatures can be reached with glow plug bodies 17' **even if the applied voltage has dropped from a nominal voltage level of 12 V to a level in the order of about 9 V in 1.5 seconds, or less**; the **power consumption is only half** that as in known glow plugs utilizing a thin-walled metallic glow plug housing within which a resistance wire is placed, embedded in a ceramic material.

US004762982 (Ohno et al) discloses:

5) **Conventionally**, **high voltage V.sub.1** is applied in the initial current supplying period to abruptly heat the **ceramic glow plug** for a diesel engine, for example to about **900.degree. C**. in **about three seconds** after every starting of the engine as shown in FIG. 12. When the temperature of the glow plug reaches about 900.degree. C. (at which temperature the **sintered** body of the glow plug is not cracked and the glow plug can perform ignition), **low voltage V.sub.2 is applied to maintain the stable saturation temperature (about 1,150.degree. C.).** Then current supply is stopped. In this way, one cycle is completed to facilitate the starting of the diesel engine.

(42) **Ceramic** of the **ceramic heaters used** for the present invention is non-oxided ceramic such as silicon nitride (Si.sub.3 N.sub.4) or oxided ceramic such as alumina (Al.sub.2 O.sub.3). The current supply method of the present invention can be applied to heaters made of these **numerous ceramic sintered bodies**.

In regard to claims **36** and **37,** for the purpose of providing an electric resistance ignition elements as an ignition source which can achieve operating temperature in a period less than 6 seconds, can be used for an extended period of time regardless of environmental conditions and is superior in ignition reliability and safety, it would have been obvious to a person having ordinary skill in the art to modify the electric resistance ignition element of **US003589846 (Place)** to be sintered ceramic igniter, in view of the teaching of **US004418661 (Esper), US005233166 (Maeda et al)** or **US004762982 (Ohno et al)**.

Conclusion

See the attached USPTO form 892 for prior art made of record and not relied upon which is considered pertinent to applicant's disclosure.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Carl D. Price whose telephone number is (571) 272-4880. The examiner can normally be reached on Monday through Friday between 9:00am-5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven B. McAllister can be reached on (571) 272-6785. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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